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# **IS THERE A GENDER BIAS IN CRIME AGAINST FIRMS FOR DEVELOPING ECONOMIES?**

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# IS THERE A GENDER BIAS IN CRIME AGAINST FIRMS FOR DEVELOPING ECONOMIES?

## Abstract

The literature has typically found a positive relationship between crime rates and female headed households. Female headed households tend to indicate instability and vulnerability, and thus a positive relationship may not be surprising. This study explores the relationship between female owned firms and losses due to crime experienced by firms using data for about 12,000 firms in 27 developing countries. Although we do find a similar positive relationship between female owned firms and losses due to crime, the results may suggest that the reason may be a gender bias in the incidence of crime. We find similar results for female owned and managed firms and losses due to crime. We also find that several macro-economic factors can weaken or strengthen the relationship between crime and female ownership and management. The results are robust to various sensitivity checks.

## 1. Introduction

A common theme in the crime literature is that there is a strong positive correlation between the proportion of female headed households and criminal activities in a geographical area. Several hypotheses have been suggested for this. Female headed households tend to be more unstable and usually face an increased risk of poverty and are thus more susceptible to crime (Kelly, 2000). Female headed households also indicate disorientation and conflict in personal relations and thus are more susceptible to crime (Demombynes and Ozler, 2005). Alternate theories such as the possibility that female headed households are positively correlated with crime because a high level of crime among men lead females to avoid marriage has been refuted (Glaeser and Sacerdote, 1999). There are two key features this study attempts to add to the existing literature. First, extend the results for crime against individuals to crime against firms. Second, if female ownership of firms is positively correlated with crime, and there are no reasons a priori to expect female owned firms to be more vulnerable or - drawing an analogy from existing literature -

more unstable, what does this imply about other possible channels that may explain the gender-crime relationship?

The importance of crime against firms for developing countries cannot be understated. Increase in crime against firms is likely to deteriorate the crucial business environment for many developing countries, and thus be a huge deterrent for economic growth. Most of the existing literature on crime uses count-level data, focusing on the incidence of crime or typical crime rates. Very few studies have examined crimes against firms, or even the burden of crime, as measured by losses due to crime. Older studies have found that firms have higher rates of victimization than households – in a British crime surveys, 24% of retailers and manufacturers were burgled in 1993 in contrast to 5.6% of households (Hopkins, 2002). A few studies have explored various relationships between firm characteristics and crime against firms. Using a sample of Latin American countries, it is found that large firms experience more crime than small firms, although small firms face a larger burden of crime (Amin, 2009). It has also been shown that for informal firms in Africa owned by immigrants are more susceptible to crime than native owned firms. The relationship between firms with female owners and various outcomes has also been under researched. Amin (2010) finds that for unregistered firms in Africa, female owned firms tend to be smaller in size than male owned firms. The present study adds to the literature on crime against firms by exploring the linkages between female ownership, losses due to crime, and the influence of macro-economic characteristics and indicators.

What are the implications of a positive gender-crime relationship? Although, identifying the exact causal link is beyond this study due to data limitations, there are a couple of reasons for

such a relationship. One possibility is that women are less well off and perceived to be weaker or more vulnerable in developing economies, and thus easier targets for criminal activity, essentially implying a gender-bias in crime against firms. Another plausible reason is that firms with a female owner have a bias towards certain industries, sizes or firm types and thus it is a combination of certain characteristics highly correlated with firms that have a female ownership that results in this positive correlation.

The goal of this paper is two-fold. First, this study will quantify the effect of female ownership on the burden of crime on firms. Second, the study will explore how several macro-economic variables influence this gender-crime relationship – whether they strengthen or weaken it – and thus illuminating possible macro channels. We use a unique firm level dataset with about 12,000 firms in 27 developing countries maintained by the World Bank’s Enterprise Analysis unit (Enterprise Surveys) to examine this relationship. We find that firms that have a female owner face a 0.030 standard deviation increase in crime losses over sales, while firms that have both a female owner and manager face a 0.059 standard deviation increase in crime losses over sales relative to the remaining firms. High levels of growth, development, good governance, and high religious fractionalization within an economy is seen to reduce this gender bias with regards to female ownership and crime. We also find that high growth, and a larger police force mitigates the positive relationship between crime losses and firms with female owners and managers, while high levels of schooling in the overall economy reverses the relationship – firms with female owners and managers experience lower losses from crime than firms without female owners and managers. We use % of females in parliament, and whether a state subsidizes

childcare or has a public provision for it as instruments for female ownership and find that the results are retained, if not magnified. The results are also robust to various sensitivity checks.

Section 2 describes the data, section 3 provides the estimation and results, and sections 4, 5, and 6 provide instrumental variable estimations, robustness checks, and conclusions respectively.

## **2 Data and Main Variables**

The data for firm level variables are collected by the World Bank's Enterprise Analysis Unit (Enterprise Surveys). The Enterprise Surveys use standard survey instruments to collect firm-level data on a country's business environment from business owners and top managers. The surveys cover a broad range of topics including access to finance, corruption, infrastructure, crime, competition, labor, obstacles to growth and performance measures. The survey is designed to be representative of a country's private non-agricultural economy and only registered firms with at least five employees are included in the sample. The data consists of a random sample of 12,000 firms across 27 developing countries in different regions stratified by firm size, location, and sector. The survey year ranges between 2007 and 2009. Details of countries in the sample and their respective survey years can be found in the first column of table A3 in the appendix. The survey data and questionnaire can be accessed from the website:

<http://www.enterprisesurveys.org/>

### *2.1 Dependent variable*

The dependent variable utilized is losses due to crime as a percentage of annual sales. This variable is derived from the survey question: “In fiscal year [insert fiscal year], what are the estimated losses as a result of theft, robbery, vandalism or arson that occurred on establishment’s premises calculated as a percent of annual sales or the total annual value of the losses?”

For total values of crime, the percentage over sales is calculated. Crime losses as a % of sale capture the intensity of crime. We make no distinction between a firm that has experienced no crime and a firm that has experienced crime but incurred no losses. Both firms get a zero value for the dependent variable. The variable averages 0.72% in the sample with a standard deviation of 3.9%. Using country averages across all firms, Azerbaijan has the lowest amount of crime losses at 0.20% of sales, while El Salvador has the highest with 1.73%. Data source and description of the variable can be found in table A1, with summary statistics in table A2.

## *2.2 Explanatory variable*

The main variable of interest is a dummy representing whether or not a firm has one or more female owners. The dummy equals 1 to a yes response to the following survey question: "Are any of the owners female?" About 42% of the firms in the sample have at least one female owner. Using country level averages we find that the Philippines has the highest percentage of firms with female owners (65.68%), while Azerbaijan has the lowest (13.28%).

As a further check, we replace the explanatory variable with a dummy that captures whether or not a firm has both at least one female owner and a top female manager. Using country level averages, we find that the Mongolia has the highest % of firms with at least a female owner and female top manager (36.16%), while Azerbaijan has the lowest (3.26%). The country average

crime losses and number of female owners and managers are presented in table A4 for each country in the appendix.

### *2.3 Other explanatory variables*

We control for several firm level and country level variables. The degree of crime a firm faces may depend on its size, the sector it belongs to, and its locale (Amin, 2009; Glaeser and Sacerdote, 1999). We control for firm size using dummies for small and medium firms. A small firm is defined as a firm with less than 20 employees, while a medium firm has workers between 20 and 99. We also have a dummy for manufacturing firms. A priori it is not clear whether a manufacturing firm should have higher crime losses with respect to other sectors, but it is quite possible that in some countries, a particular sector is more susceptible to crime. We also include a city size dummy which takes the value of 1 if the city has a population of 250,000 or greater, or is a capital city, and takes a value of 0 otherwise. All these variables are from the Enterprise Survey's data set.

At the country level we control for Real GDP per Capita growth, the Gini index, and Real GNI per capita given their prominence in the literature (Fajnzylber et al, 2002). We control for the number of police personnel per 100,000 of population. The variable is obtained from United Nations Survey on Crime Trends and the Operations of Criminal Justice Systems. The variable is typically lagged by 1 year, however due to data constraints, for some countries the lag is not exactly one year previous, but a few years before in certain cases. Similarly, for years where Gini and GNI per capita data are not available we use the data for the closest available year. The exact year of data used for number of police, GNI per capita and the Gini index are presented in table A3 in the appendix. We also control for country size using the total population of the country.



Finally, we also control for the level of inequality in the country using the Gini index. These data are available from the World Bank's World Development Indicators. Data source and description of the variable can be found in table A1, with summary statistics in table A2.

### 3. Estimation

We estimate following equation using OLS.

$$(1) \quad \text{crimeloss}_{ij} = \beta_1 \text{Fem}_{ij} + \beta_2 \text{GDPgr}_j + \beta_3 \text{Policelag}_j + \beta_4 \text{GNicap}_j + \beta_5 \text{GINI}_j + \beta_6 \text{Population}_j + \beta_7 \text{Small}_{ij} + \beta_8 \text{Medium}_{ij} \\ + \beta_9 \text{LargeCity}_{ij} + \beta_{10} \text{Manf}_{ij} + \varepsilon_{ij}$$

Where *crimeloss* is the losses due to crime as a % of sales, *Fem* is a dummy representing female ownership (which is later replaced by female manager and ownership), *Policelag* is the lagged number of police per 100,000 population, *GDPgr* is the real GDP per capita growth, *GNicap* is the real GNI per capita, *GINI* is the gini coefficient, *Population* is the total population of the economy, *Small* and *Medium* are firm size dummies, *LargeCity* is a dummy for cities with population of 250,000 and greater, or capital cities, and finally *Manf* is a dummy for manufacturing firms.

All estimates are based on standard errors clustered at the country level. In the later sections, we add additional variables and interact them with the variable of interest to elucidate several relationships. The usual econometric issues of endogeneity and omitted variable bias are of a concern in the estimation. Reverse causality is less of an issue as if expected crime leads to lower female ownership under the assumption that firms with female owners are easy targets for criminal activity, then any positive relationship we uncover between female firm ownership and

crime would be even stronger than the results we obtain once reverse causality is accounted for. On the other hand omitted variable bias is an issue that is challenging to overcome given data limitations. We address this by using the instrumental variable regression method instruments and various checks as presented in the robustness section below.

### **3.1 Base Regression Results**

All magnitudes discussed in the text are presented in standard deviation units, unless indicated. The figures shown in the tables are in nominal units, not standard deviation units. Since the dependent variable is a ratio of losses due to crime to sales, any reference to a reduction in crime refers to a reduction in losses due to crime as a share of sales. The base results are present in table 1. Column 1 indicates that firms that have a female owner face a 0.03 standard deviation increase in crime losses, significant at 10%<sup>1</sup>. The sign and significance of these results are unchanged when the estimation is done without any controls. The reduction in crime losses when the controls are excluded from the estimation is 0.035 standard deviation units, significant at 10%. Since there is the possibility that a firm may have many male owners and just one female owner, and thus weakening the correlation between crime and female ownership, I examine the effect of a firm having both a female owner and manager on crime. The justification being that when a firm has both a female owner and manager, there is a more female visibility than female owner alone. Column 2 of table 1 reports the results for firms with both a female owner and manager. Firms with both a female owner and manager experience a 0.059 standard deviation increase in losses due to crime, significant at 10%. This result is consistent with the literature for

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<sup>1</sup> The sign and significance of these results are unchanged when the estimation is done without any controls. The reduction in crime losses when the controls are excluded from the estimation is 0.035 standard deviations, significant at 10%

individual level crime where the proportion of female headed households is positively correlated with crime (Demombynes and Ozler, 2005; Kelly, 2000).

A few other results stand out. Both real GDP per capita growth and Real GNI per capita have a negative and highly significant effect on losses due to crime<sup>2</sup>. Although the negative effect of GDP per capita growth is not surprising considering individual level crime (Fajnzylber et al., 2002; Soares, 2004), the negative effect of GNI per capita crime has been less robust in the literature (Soares, 2004). Thus development may not be criminogenic at the firm level. The Gini coefficient and dummy for large or capital city are not significant despite their well documented effect on individual level crime (Dutta, 2009; Glaeser and Sacerdote, 1996). An increase in the police force reduces losses due to crime, a result in the literature that was initially difficult to uncover due to identification issues, but eventually found some support (Levitt, 2004; Di Tella and Schargrotsky, 2004). The size of the country in terms of population has a positive effect on the dependent variable, implying that firms in larger countries experience greater losses due to crime than smaller ones.

Certain firm characteristics are found to be significant determinants of the losses due to crime. Small or medium firms are more likely to experience higher losses due to crime than large firms. This may be potentially due to the security measures that large firms are able to implement. Manufacturing firms are less likely to sustain heavy losses due to crime compared to service sector firms.

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<sup>2</sup> Due to the lack of continuous data for GNI per capita for some countries, we use the GDP growth rate instead of the GNI growth rate. This is typical in the literature (Fajnzylber et al, 2002). The results for GDP per capita growth are retained if we use the level of GDP per capita instead of GNI per capita.

We now flesh out the relationship between gender and crime against firms. Several factors may reduce or accentuate the degree of losses due to crime experienced by firms with a female owner relative to firms with no female owner. Such potential factors such as economic growth, income, industry, schooling, religious fractionalization and governance are explored. Probing how the relationship between crime and female ownership is weakened or strengthened by the above factors will inform us on whether the stated factors benefit females more than males as far as crime is concerned.

### *3.2 Growth and Development*

The interaction term between firms with female owners and GDP per capita growth, or firms with female owner and GNI per capita is negative and significant at 10% for the former, and 5% for the latter. Firms with at least one female owner experience higher losses due to crime than firms with all male owners, after interacting GDP per capita growth with female ownership. This relationship ceases to be significant at the sample maximum of GDP per capita growth, and actually retains significance and increases in magnitude at the sample mean of GDP per capita growth. The bottom of column 1 of table 2 presents the magnitude of the effects. At the sample mean of GDP per capita growth we have a 0.03 standard deviation increase in crime, while at the sample minimum of GDP per capita growth we have an 0.084 standard deviation increase in crime, the result being significant at 5%. The turning point for economic growth in the sample, beyond which there is no significant relationship at all conventional levels of significance between having or not having a female owner and crime losses, is 3.65% which is around the 66<sup>th</sup> percentile of the sample. This is about one percentage point greater than the mean economic growth of the sample.

The results are starker for real GNI per capita, as indicated in column 2 of table 2. At the sample mean and minimum of GNI per capita, female ownership has a positive and significant effect on crime when interacting female ownership with GNI per capita. However, the relationship between female ownership and crime becomes negative and significant effect at the sample maximum of GNI per capita. The magnitudes are indicated at the bottom of column 2 of table 2. At the sample mean, minimum, and maximum levels of GNI per capita, the effect on the dependent variable is 0.030, 0.064 and negative 0.074 standard deviations respectively with a significance of at least 10%. The relationship between female ownership and crime loses significance at the GNI per capita of about 6,700USD. The negative relationship between female firm ownership and crime becomes significant only at the GNI per capita of 14,100USD, which is essentially the maximum value of real GNI per capita in the sample. The strong implication here is that development may be beneficial to female owners of firms more than to firms with only male owners.

The implication of the above results may indicate that faster economic growth reduces the chance that firms with female ownerships are likely to be victims of crime. More interestingly, at high levels of GNI per capita, firms with no female owners are significantly less likely to suffer larger losses due to crime than males. It is understandable that female owned firms face fewer losses due to crime as a country develops, as institutions develop that are favorable to them. However, it is unclear why such a relationship turns to the opposite direction against men.

### *3.3 Industry*

The interaction term between firms with female owners and firms in the manufacturing sector is negative and significant at 10% in its impact on the dependent variable (table 2, column 3).

While female owned firms face more losses from crime than male owned firms, the difference is significantly larger for non-manufacturing firms than manufacturing firms. Non-manufacturing firms with female owners experience a 0.062 standard deviation increase in crime losses significant at 5%, in contrast to 0.003 standard deviation increase for manufacturing firms which is insignificant at all conventional levels of significance.

### *3.4 Schooling*

One of the common deterrents of criminal activities is the presence of labor market opportunities (Becker, 1968). The results in column 1 of table 3 show that the interaction between firms with a female owner and years of schooling in the economy on average is negative and significant at 1%. At the mean level of schooling, firms with a female owner experience greater losses due to crime when interacting schooling with female ownership. This result is maintained at the minimum level of years of schooling, however, at the sample maximum of schooling, female ownership has a negative and significant effect on crime. The magnitudes are presented at the bottom of column 1 in table 3. At the sample mean, minimum, and maximum levels of years of schooling, the effect on the dependent variable is 0.034, 0.166 and negative 0.061 standard deviations respectively with a significance of at least 5%. Assuming a larger number of years of schooling is positively correlated with higher education for females, one interpretation could be that females are more educated and less vulnerable in economies with higher schooling, and consequently experience fewer losses due to crime than males. Explaining why firms with all owners being male results in an increase in losses due to crime is more difficult, with a

possibility being that in economies with high education, females tend to be better educated than males.

### *3.5 Religious Fractionalization*

Social disorganization theories indicate that factors that diminishes the effectiveness of informal social controls increase criminal activity (Kelly, 2000). However, in the case for females, speaking specifically of religious fractionalization, a greater diverse religious community may limit any restrictions placed on females for any particular religions, and thus there may be discriminated less. The interaction between religious fractionalization and firms with female owners is negative and significant at 5%. We find that at the mean and minimum level of religious fractionalization, female ownership has a 0.030 and 0.082 standard deviation increase in crime respectively with a significance level of at least 5% as shown in the bottom of column 2 in table 3. At the maximum level of fractionalization in the sample, the relationship between female ownership in firms and crime losses lose their significance. The turning point of religious fractionalization beyond which the relationship between female ownership and crime losses lose their significance is 0.37 which is around the 62<sup>nd</sup> percentile of the sample. This lends some credence to the hypothesis that in most religiously fractionalized societies, females are least vulnerable, and economic growth is more effective in reducing the susceptibility of females to crime than of males.

### *3.6 Governance*

In column 3 of table 3, we use ICRG's Quality of government indicator as measure of governance. Note that higher values of the variable indicate better governance. The interaction term between quality of government and firms with female owners is negative and significant at 10%. We find that at the mean and min level of governance, economic growth has a negative and significant effect on crime. This relationship loses significance at the maximum level of the governance index. The magnitude of the reduction in crime due to economic growth is 0.032 and 0.088 standard deviations at the sample mean and minimum respectively, significant at 5%. That is a high level of governance in terms of quality is associated with firms with female owners being less likely to be targeted by criminal activity than males.

### *3.7 Female Managers and Owners*

Given the limitations of the data, it is not possible to know the proportion of owners that are female, but only whether or not a firm has a female owner. Thus, in order to capture firms that have a significance female presence, we consider the effect on crime losses due when a firm has both a female owner and a female manager. As indicated by the results shown in Tables 4, the qualitative results are similar for GDP per capita growth and years of schooling, but with a greater magnitude in the effects when compared to the estimates of female ownership alone. The magnitude of the effects of female ownership and management almost doubles when including the interaction term between GDP per capita growth and female ownership and management. There are two differences however. Including the interaction term between police and female ownership and management provides a positive significant relationship between the police and female ownership and management and crime at the sample mean and minimum levels of police. However, at the maximum level of police, the relationship turns insignificant. Secondly the



effect of a manufacturing firm having a female owner on losses due to crime is insignificant for female ownership but positive and significant for female ownership and management. One possible explanation could be that for manufacturing firms, female owners are hardly present on location but female managers are. This would explain the positive and significant effect that female owners and managers have on losses due to crime for manufacturing firms. However, there is no clear reason why non-manufacturing firms with a female owner and manager show no significant difference in losses from crime than non manufacturing firms with all male owners and managers.

One major concern about the estimations is that the relationship between female ownership and losses due to crime may be spurious. Essentially, female ownership may be capturing something else that is not included in the estimations. We mitigate this possibility by using instruments and subjecting the base estimates to several robustness checks.

#### **4. Instrumental Variables**

We use two instruments – the percentage of women in parliament, and whether the government either subsidizes childcare or has laws establishing the public provision of childcare. The latter variable is obtained from the World Bank’s Women, Business and the Law – Removing Barriers to Economic Inclusion Report. The report examines laws and regulations that affect women’s ability to earn an income, either by starting and running their own businesses or by getting jobs. Information about laws and regulations that affect women were gathered from family lawyers, labor lawyers, and civil society organizations in their respective economies.

We expect that public provision of childcare or government childcare subsidies ease constraints on women in the labor market and thus encourage female ownership and participation in the labor markets. There is also a tendency in developing countries for women to substitute private sector jobs for public sector jobs. Typically in developing countries, the % of employment of women in the public sector is greater than the % of total employment in the public sector (Hammouya, 1999). Therefore a higher % of women in parliament may indicate a preference towards public sector jobs by women as opposed to the private sector. Thus we expect a negative correlation between female ownership in the private sector and % of women in parliament. A priori there is no reason to expect a direct link between women in parliament, and public childcare provisions on crime. The first stage estimations are presented in column 1 of table 6. As expected, childcare subsidies have a positive relationship with female ownership while women in parliament have a negative correlation with female ownership. The second stage results are presented in column 1 of table 5. The effect of female ownership of firms is positive and significant at 1%. As indicated in the bottom of column 1, the Sargen-Hansen test of overidentifying restrictions is not rejected for all conventional levels of significance, thus we cannot reject the null that all the instruments are valid. We also reject that the estimation is underidentified at 10% level of significance. We use the same instruments for the estimation where the variable of interest is firms with both at least a female owner and manager. The first stage results are presented in column 2 of table 6, while the second stage is presented in column 2 of table 5. Although the sign of the coefficient is positive and significant at 1% with the overidentifying test indicating the instruments are valid, the estimation fails the test of underidentification. Thus, we include an additional instrument which is a dummy equaling 1 if employers are required to provide breaks for nursing mothers by law. The distinction between

childcare subsidies and a law requiring breaks for nursing mothers is that the former alleviates women's constraints in the private sector, while the latter may make it costlier for employees in the private sector to hire female workers in order to follow the regulations. Another explanation may be that regulations for nursing breaks may proxy regulation stringency overall. This would also be especially true for females in managerial positions. Thus we expect a negative relationship between a law requiring employers to provide nursing breaks for mothers and firms with female managers and a positive relationship between childcare subsidies and firms with female managers. The first stage IV regression is presented in column 3 of table 6. As expected public childcare subsidies have a positive relationship with firms with both female managers and owners while nursing-break-regulations has a negative effect of firms with female managers and owners. The second stage results are presented in column 3 of table 5. With the addition of the "nursing break regulation" instrument, we have a positive coefficient for female owners and managers on losses due to crime significant at 1 % as indicated in. The instruments pass both the overidentification and underidentification tests<sup>3</sup>.

## **5. Robustness**

We check for the robustness in terms of model specification. Several studies have shown that demographics (Kovandzic and Sloan, 2002; Kelly, 2000; Di Tella and Schargrotsky), corruption (Gaviria, 2002), ethnic division (fajnzylber, lederman, and loayza, 2000; Ghosh et al., 2011), prison population (Kovandzic and Sloan, 2002; levitt, 2004), and government spending (Naidoo,

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<sup>3</sup> As indicated in the first stage results for estimates using both female owner and manager as the variable of interest, the % of women in parliament variable is not significant. All the results are retained whether or not we include the % of women in parliament. However, including this variable enables us to pass the underidentification test at 5% level of significant.

2006) are factors that influence crime. We add sets of variables that proxy for the aforementioned factors and present the results in table A5. We also include firm level variables such as total employees and security costs as a % of total sales and check if they affect our estimation of interest. As shown in table A5, including these sets of variables neither improves the goodness of fit, and thus does not improve explanatory power of the model, nor reduce the significance of the variable of interest.

We also worry that extreme observations in the sample may be driving the results. Thus we omit the top 1%, bottom 1 %, and top and bottom 1% observations of losses due to crime, to see if our results are retained. As indicated in table A6, the significance of our results is unaffected.

## **6. Conclusion**

This study contributes to the literature by examining the relationship between female ownership and management of firms and crime against firms, a fairly under-researched area. The paper finds a positive relationship between firm losses due to crime and female ownership. Expressed in terms of standard deviations, we find that firms with at least one female owner experience a 0.030 standard deviation increase in losses due to crime over total sales. This figure is 0.059 standard deviations for firms with at least one female owner and a female manager. One possible explanation for this is that there exists a gender bias in crime against firms – firms with a female presence at the upper level of the decision making process are preferred targets for criminal activity. We find that high levels of economic growth, development, good governance, and high religious fractionalization within an economy is seen to reduce this gender bias with regards to female ownership and crime losses. We also find that high economic growth, and a larger police

force mitigates the positive relationship between crime losses and firms with female owners and managers, while high levels of schooling actually reverses the relationship – firms with female owners and managers experience lower losses due to crime than firms without female owners and managers.

Possible ways to extend this paper would be to check if the results hold for developed economies as well. It would also be interesting to validate these results using data with some time variation. Finally, it would be valuable to revisit household level crime and see if the positive relationship between female headed households and crime still persists for well off female headed households.

TABLE 1: GENDER AND CRIME AGAINST FIRMS

	OLS: % Loss Over Sales due to Crime	OLS: % Loss Over Sales due to Crime
	1	2
Firm with Female Owner	0.1181* [0.0632]	
Firm with female owner and manager		0.2345* [0.1251]
Real GDP per Capita Growth	-0.0808*** [0.0208]	-0.0862*** [0.0243]
Police per 100,000 persons lagged	-0.0011* [0.0005]	-0.0011** [0.0005]
Real GNI per capita in 100s	-0.0058*** [0.0012]	-0.0057*** [0.0012]
GINI	-0.0065 [0.0113]	-0.0086 [0.0129]
Population in Millions, Total	0.0034* [0.0017]	0.0034** [0.0016]
Small firms	0.4023*** [0.0940]	0.3535*** [0.0982]
Medium firms	0.1664** [0.0658]	0.1345* [0.0757]
Large City or Capital	0.0331 [0.0953]	0.0536 [0.0900]
Manufacturing	-0.2238** [0.0813]	-0.2323** [0.0879]
Number of Countries	27	27
Number of Observations	12274	12499
Change in the Standard Deviation of the Dependent Variable when firm has a female owner (column 1) of female owner and manager (column 2)	0.030*	0.059*

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%, Standard errors in brackets clustered at the country level

TABLE 2: GENDER AND CRIME AGAINST FIRMS (LOSSES DUE TO CRIME/SALES)

	Female Owner x GDP Growth	Female Owner x Real GNI per capita	Female Owner x Manufacturing
	1	2	3
Firm with female owner	0.1886** [0.0851]	0.2625** [0.0982]	0.2424** [0.1078]
Female Owner x Real GDP per Capita Growth	-0.0260* [0.0149]		
Female Owner x Real GNI per Capita		-0.0039** [0.0017]	
Female Owner x Manufacturing			-0.2318* [0.1261]
Real GDP per Capita Growth	-0.0695*** [0.0219]	-0.0807*** [0.0207]	-0.0810*** [0.0209]
Police per 100,000 persons lagged	-0.0010* [0.0005]	-0.0010* [0.0005]	-0.0011* [0.0005]
Real GNI per capita in 100s	-0.0058*** [0.0012]	-0.0042*** [0.0013]	-0.0058*** [0.0012]
GINI	-0.0062 [0.0113]	-0.0066 [0.0112]	-0.0067 [0.0114]
Population in Millions, Total	0.0034* [0.0018]	0.0033* [0.0017]	0.0035* [0.0017]
Small firms	0.3945*** [0.0950]	0.4024*** [0.0939]	0.4038*** [0.0948]
Medium firms	0.1609** [0.0650]	0.1654** [0.0649]	0.1700** [0.0659]
Large City or Capital	0.0321 [0.0951]	0.0358 [0.0946]	0.0367 [0.0955]
Manufacturing	-0.2240** [0.0810]	-0.2235** [0.0812]	-0.1273 [0.0787]
Number of Countries	27	27	27
Number of Observations	12274	12274	12274
Change in the Standard Deviation of the Dependent Variable when firm has a female owner			
Using Mean	0.030*	0.030**	
Using Min	0.084**	0.064***	
Using Max	0.019	-0.074*	
Interacted Dummy =0			0.062**
Interacted Dummy =1			0.003

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%, Standard errors in brackets clustered at the country level

TABLE 3: GENDER AND CRIME AGAINST FIRMS (LOSSES DUE TO CRIME/SALES)

	Female Owner x Years of Schooling	Female Owner x Religious Fractionalization	Female Owner x Quality of Government
	1	2	3
Female Owner	0.9819*** [0.2107]	0.3266*** [0.1027]	0.8046** [0.3660]
Female Owner x Years of Schooling	-0.1000*** [0.0238]		
Years of Schooling	0.001 [0.0409]		
Female Owner x Religious Fractionalization		-0.6208** [0.2410]	
Religious Fractionalization		0.5462** [0.2406]	
Female Owner x Quality of Government			-1.2920* [0.6641]
Quality of Government			-0.819 [0.8113]
Real GDP per Capita Growth	-0.0929*** [0.0299]	-0.0752*** [0.0223]	-0.0879*** [0.0208]
Police per 100,000 persons lagged	-0.0017* [0.0009]	-0.0009* [0.0005]	-0.0014** [0.0005]
Real GNI per capita in 100s	-0.0055*** [0.0010]	-0.0051*** [0.0012]	-0.0031 [0.0018]
GINI	-0.0187 [0.0232]	0.0005 [0.0129]	-0.014 [0.0120]
Population in Millions, Total	0.0034* [0.0017]	0.0041** [0.0017]	0.0030* [0.0016]
Small firms	0.4637*** [0.0947]	0.4012*** [0.0933]	0.4082*** [0.1024]
Medium firms	0.2283*** [0.0617]	0.1640** [0.0666]	0.1768** [0.0660]
Large City or Capital	0.057 [0.1147]	0.0372 [0.0943]	0.0253 [0.1023]
Manufacturing	-0.2430** [0.1024]	-0.2260** [0.0817]	-0.2385** [0.0889]
Number of Countries	22	27	24
Number of Observations	10661	12274	11242
Change in the Standard Deviation of the Dependent Variable when firm has a female owner			
Using Mean	0.034**	0.030**	0.032**
Using Min	0.166***	0.082***	0.088**
Using Max	-0.061**	-0.025	-0.054

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%, Standard errors in brackets clustered at the country level



TABLE 4: GENDER AND CRIME AGAINST FIRMS (LOSSES DUE TO CRIME/SALES)

	Female Owner & Manager x GDP Growth	Female Owner & Manager x lagged Police	Female Owner & Manager x Years of Schooling	Female Owner & Manager x Manufacturing
	1	2	3	4
Firm with Female Owner & manager	0.4054** [0.1587]	1.0427*** [0.2078]	2.1067*** [0.5234]	0.1255 [0.1327]
Female Owner & Manager x Real GDP per Capita Growth	-0.0554** [0.0259]			
Female Owner & Manager x lagged Police		-0.0028*** [0.0006]		
Female Owner & Manager x Years of Schooling			-0.2218*** [0.0548]	
Years of Schooling			-0.0201 [0.0391]	
Female Owner & Manager x Manufacturing				0.2252* [0.1271]
Real GDP per Capita Growth	-0.0763*** [0.0261]	-0.0856*** [0.0237]	-0.1018*** [0.0343]	-0.0861*** [0.0243]
Police per 100,000 persons lagged	-0.0011* [0.0005]	-0.0008 [0.0005]	-0.0017* [0.0010]	-0.0011** [0.0005]
Real GNI per capita in 100s	-0.0056*** [0.0012]	-0.0056*** [0.0011]	-0.0052*** [0.0010]	-0.0056*** [0.0012]
GINI	-0.008 [0.0129]	-0.0093 [0.0128]	-0.0242 [0.0246]	-0.0085 [0.0129]
Population in Millions, Total	0.0034** [0.0016]	0.0029* [0.0016]	0.0039** [0.0016]	0.0035** [0.0016]
Small firms	0.3511*** [0.0977]	0.3513*** [0.0990]	0.4081*** [0.1005]	0.3525*** [0.0983]
Medium firms	0.1336* [0.0758]	0.1328* [0.0754]	0.1921** [0.0743]	0.1322* [0.0757]
Large City or Capital	0.0546 [0.0903]	0.0579 [0.0901]	0.0873 [0.1089]	0.0509 [0.0902]
Manufacturing	-0.2297** [0.0885]	-0.2275** [0.0880]	-0.2470** [0.1089]	-0.2668*** [0.0897]
Number of Countries	27	27	22	
Number of Observations	12449	12449	10812	12449
Change in the Standard Deviation of the Dependent Variable when firm has a female owner & manager				
Using Mean	0.064**	0.056**	0.054**	

Using Min	0.178**	0.196***	0.344***
Using Max	-0.040	-0.080**	-0.150***
Interacted Dummy =0			0.031
Interacted Dummy =1			0.088**

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%, Standard errors in brackets clustered at the country level

TABLE 5: GENDER AND CRIME AGAINST FIRMS – INSTRUMENTAL VARIABLES (SECOND STAGE)

	OLS: % Loss Over Sales due to Crime IV Estimates Second Stage Results	OLS: % Loss Over Sales due to Crime IV Estimates Second Stage Results	OLS: % Loss Over Sales due to Crime IV Estimates Second Stage Results
	1	2	3
Firm with Female Owner	1.1510*** [0.4234]		
Firm with female owner and manager		2.2930*** [0.8847]	3.2950*** [1.0433]
Real GDP per Capita Growth	-0.0735*** [0.0200]	-0.0708*** [0.0252]	-0.0632** [0.0257]
Police per 100,000 persons lagged	-0.0009** [0.0005]	-0.0010** [0.0004]	-0.0009** [0.0004]
Real GNI per capita in 100s	-0.0043*** [0.0010]	-0.0030** [0.0014]	-0.0016 [0.0015]
GINI	-0.0004 [0.0111]	0.0048 [0.0126]	0.0112 [0.0124]
Population in Millions, Total	0.001 [0.0016]	0.0021 [0.0015]	0.0014 [0.0018]
Small firms	0.4015*** [0.0905]	0.141 [0.1355]	0.0311 [0.1871]
Medium firms	0.1718** [0.0726]	0.0642 [0.0902]	0.0314 [0.1049]
Large City or Capital	0.0643 [0.1095]	0.083 [0.0996]	0.1093 [0.0986]
Manufacturing	-0.2176** [0.0877]	-0.1931** [0.0945]	-0.1703* [0.0894]
Number of Countries	26	26	26
Number of Observations	11478	11634	11634
Instruments	% of women in parliament, State subsidizes or provides childcare	% of women in parliament, State subsidizes or provides childcare	% of women in parliament, State subsidizes or provides childcare, Employers required to provide breaks for nursing mothers
Under-identification test (Kleibergen- Paap LM statistic) P-value:	0.0570	0.1192	0.0774
Hansen J statistic (over-identification test of all instruments) p-value:	0.3501	0.8298	0.4339

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%, Standard errors in brackets clustered at the country level

TABLE 6: GENDER AND CRIME AGAINST FIRMS – INSTRUMENTAL VARIABLES (FIRST STAGE)

	Female Owner: First Stage Results	Female Owner and Manager First Stage Results	Female Owner and Manager First Stage Results (Additional instrument)
	1	2	3
State subsidizes or provides childcare	0.2256*** [0.0510]	0.1317*** [0.0355]	0.1110*** [0.0384]
% of women in parliament	-0.0057*** [0.0015]	-0.0017 [0.0017]	-0.0019 [0.0017]
Employers required to provide breaks for nursing mothers			-0.0834** [0.0432]
Real GDP per Capita Growth	-0.0035 [0.0042]	-0.0064 [0.0042]	-0.0026 [0.0047]
Police per 100,000 persons lagged	0.0002 [0.0002]	0.0001 [0.0001]	-0.0002** [0.0001]
Real GNI per capita in 100s	-0.0011** [0.0005]	-0.0013*** [0.0004]	-0.0010*** [0.0004]
GINI	-0.0027 [0.0034]	-0.0066** [0.0030]	-0.0042 [0.0033]
Population in Millions, Total	0.0032*** [0.0005]	0.0012*** [0.0004]	0.0005 [0.0006]
Small firms	0.0166 [0.0346]	0.1114*** [0.0160]	0.1109*** [0.0160]
Medium firms	-0.0039 [0.0277]	0.0346*** [0.0088]	0.0339*** [0.0087]
Large City or Capital	-0.0367 [0.0225]	-0.0141 [0.0104]	-0.0112 [0.0105]
Manufacturing	-0.0101 [0.0141]	-0.0209*** [0.0080]	-0.0199** [0.0082]
Number of Countries	26	26	26
Number of Observations	11478	11634	11634

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%, Standard errors in brackets clustered at the country level

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TABLE A1: VARIABLE DEFINITIONS

Variable	Definition	Data Source
Losses Due to Crime (% of sales)	Response to the Question: “In fiscal year [insert fiscal year], what are the estimated losses as a result of theft, robbery, vandalism or arson that occurred on establishment’s premises calculated as a percent of annual sales or the total annual value of the losses?” For actual values, % of sales was calculated.	Enterprise Surveys, World Bank
Experienced Crime	Response to the Question: “In fiscal year [insert last complete fiscal year], has this establishment experienced losses as a result of theft, robbery, vandalism or arson?”	Enterprise Surveys, World Bank
Real GDP per Capita Growth	Real GDP per Capita Growth Rate, constant 2000 USD	World Development Indicators (WDI), World Bank
Police per 100,000 persons lagged	Police per 100,000 persons lagged. Due to data constraints, for some countries the lag is not exactly lagged by year. Specifics of all lag years can be found in the appendix.	United Nations Survey on Crime Trends and the Operations of Criminal Justice Systems
Firm with Female Owner	Yes Response to Question: "Are any of the owners female?"	Enterprise Surveys, World Bank
Female Owner and Manager	Yes Response to Questions: “Is the Top Manager female?” and "Are any of the owners female?"	Enterprise Surveys, World Bank
Real GNI per capita (in 100s)	GNI per Capita, Constant 2000 USD	World Development Indicators (WDI), World Bank
GINI	Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.	WDI, World Bank, Development Research Group
Population, Total in millions	Total Population	World Development Indicators (WDI), World Bank
Small firms	Dummy is 1 if firm is small (<20)	Enterprise Surveys, World Bank
Medium firms	Dummy is 1 if firm is medium (20-99)	Enterprise Surveys, World Bank
Large City or Capital	Dummy is 1 if city is either the capital or has more than 250,000 population	Enterprise Surveys, World Bank
Manufacturing	Dummy is 1 for manufacturing firms	Enterprise Surveys, World Bank
Quality of Government	Mean value of the ICRG governance variables “Corruption”, “Law and Order”, and “Bureaucracy Quality”, scaled 0-1. Higher values indicate better quality of government. 1990-2007 average used.	International Country Risk Guide – The PRS Group
Polity 2	Index of Democracy (Polity 2). Score between -10 and 10 that indicate how democratic a country. Values increase with greater democracy. 1990-2007 average used.	Polity IV, <a href="http://www.systemicpeace.org/polity/polity4.htm">http://www.systemicpeace.org/polity/polity4.htm</a>
Years of Schooling	Average Years of Schooling of Population over 15. 1990-2007 average used. 1990-2007 average used.	Barro and Lee (2010)
Religion Fractionalization	Probability that two randomly selected people from a given country belong to different religions	Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003)
Employees	Response to Question: “At the end of fiscal year [insert last complete fiscal year], how many permanent, full-time	Enterprise Surveys, World Bank



	employees did this establishment employ?"	
Ethnic Fractionalization	Probability that two randomly selected people from a given country belong to different ethnicities	Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003)
Total Employees	Total number of full time permanent workers	Enterprise Surveys, World Bank
Security Costs as a % of sales		Enterprise Surveys, World Bank
Corruption (Transparency International)	Corruption Perception Index: 10 point scale where higher values indicate less corruption. 1995-2009 average used.	Transparency International ww.transparency.org
Voter Turnout	Turnout in parliamentary elections measured as the total number of votes cast divided by the number of registered voters.	IDEA: International Institute for Democracy and Electoral Assistance <a href="http://www.idea.int/vt/index.cfm">http://www.idea.int/vt/index.cfm</a>
Proportion of Female Population	Population, female (% of total)	WDI, World Bank
Percentage of Population in Urban Agglomerates	Population in urban agglomerations of more than one million is the percentage of a country's population living in metropolitan areas that in 2000 had a population of more than one million people.	WDI, World Bank
Population Density	People per sq. km of land area	WDI, World Bank
Proportion of Population between 15 and 64	Population ages 15-64 (% of total)	WDI, World Bank
Government Consumption over GDP	Total government consumption over GDP	Penn World Tables
Total Investment over GDP	Total public and private investment over GDP	Penn World Tables
Adult Prison Capacity	Prisons refer to "Prisons, Penal Institutions or Correctional Institutions" which means all public and privately financed institutions where persons are deprived of their liberty.	United Nations Survey on Crime Trends and the Operations of Criminal Justice Systems
% of women in parliament	Proportion of seats held by women in national parliaments (%)	WDI, World Bank
State subsidizes or provides childcare	Answer "Yes" to the question "Are there laws establishing the public provision of childcare or does the state subsidize childcare for children under the age of primary education?"	Women, Business and the Law 2012, World Bank
Employers required to provide breaks for nursing mothers	Answer "Yes" to the question "Are employers required to provide break time for nursing mothers?"	Women, Business and the Law 2012, World Bank

TABLE A2: SUMMARY STATISTICS

Variable	Mean	Std. Dev.	Min	Max	Data Unit
Losses Due to Crime (% of sales)	0.716	3.942	0.000	100.000	Firm
Experienced Crime	0.232		0.000	1.000	Firm
Firm with Female Owner	0.419		0.000	1.000	Firm
Female Owner and Manager	0.152		0.000	1.000	Firm
GDP per Capita Growth	2.656	4.213	-5.529	10.192	Country
Police per 100,000 persons lagged	287.894	108.187	90.110	480.013	Country
Real GNI per capita (in 100s)	37.345	31.014	2.257	141.816	Country
GINI	39.826	7.768	25.810	52.330	Country
Population, Total in millions	28.615	27.065	1.353	141.816	Country
Small firms	0.369		0.000	1.000	Firm
Medium firms	0.378		0.000	1.000	Firm
Large City or Capital	0.627		0.000	1.000	Firm
Manufacturing	0.537		0.000	1.000	Firm
Quality of Government	0.525	0.101	0.351	0.791	Country
Polity 2	6.153	3.926	-5.647	10.000	Country
Years of Schooling	8.497	1.835	3.152	12.266	Country
Religion Fractionalization	0.335	0.201	0.005	0.685	Country
Employees	121.246	478.223	1.000	20843	Firm
Ethnic Fractionalization	0.383	0.173	0.118	0.663	Country
Total Employees	121.246	478.223	1.000	20843	Firm
Security Costs as a % of sales	1.575	5.798	0.000	384.615	Firm
Corruption (Transparency International)	3.369	0.960	1.982	6.091	Country
Voter Turnout (IDEA)	0.718	0.089	0.460	0.893	Country
Proportion of Female Population	51.040	1.437	49.165	54.020	Country
Percentage of Population in Urban Agglomerates	21.463	9.672	4.406	39.027	Country
Population Density	93.841	82.521	1.610	290.871	Country
Proportion of Population between 15 and 64	64.912	4.083	56.745	70.721	Country
Government Consumption over GDP	0.081	0.038	0.047	0.213	Country
Total Investment over GDP	0.210	0.039	0.150	0.311	Country
Adult Prison Capacity	34656	37589	1017	127079	Country
% of women in parliament	21.258	10.215	4.200	41.600	Country
State subsidizes or provides childcare	0.838	0.368	0.000	1.000	Country
Employers required to provide breaks for nursing mothers	0.881	0.323	0.000	1.000	Country

TABLE A3: POLICE, GINI, AND GNI PER CAPITA DATA AND SURVEY YEAR

Country Survey Year	Police per 100,000 persons lagged Year	GINI	GNI per Capita
Argentina 2009	2008	2009	2009
Azerbaijan 2008	2006	2008	2008
Belarus 2007	2004	2007	2004
Bosnia and Herzegovina 2008	2007	2007	2007
Costa Rica 2009	2006	2009	2009
Czech Republic 2008	2007	1996	2008
Ecuador 2009	2006	2009	2009
El Salvador 2009	2006	2007	2009
Estonia 2008	2007	2004	2008
Fyr Macedonia 2008	2006	2008	2005
Hungary 2008	2007	2007	2008
Kazakhstan 2008	2007	2007	2008
Latvia 2008	2007	2008	2008
Lithuania 2008	2007	2008	2008
Moldova 2008	2007	2008	2008
Mongolia 2008	2004	2008	2000
Nepal 2008	2006	2004	2000
Nicaragua 2009	2006	2005	2009
Paraguay 2009	2006	2008	2009
Peru 2009	2004	2009	2009
Philippines 2008	2007	2006	2008
Poland 2008	2007	2008	2008
Romania 2008	2007	2008	2008
Slovak Republic 2008	2007	1996	2008
Slovenia 2008	2007	2004	2008
Turkey 2007	2006	2008	2007
Ukraine 2007	2006	2008	2007

TABLE A4: CRIME AND GENDER - COUNTRY AVERAGES

Country	% of Losses Due to Crime Over Sales	% of Firms With at Least One female Owner	% of Firms With at Least One Female Owner and Manager
Argentina	0.63	29.98	5.31
Azerbaijan	0.20	13.28	3.26
Belarus	0.72	51.04	22.82
Bosnia and Herzegovina	0.44	38.62	10.48
Costa Rica	0.54	36.31	9.96
Czech Republic	0.48	30.92	11.71
Ecuador	1.11	29.30	10.14
El Salvador	1.73	41.49	10.15
Estonia	1.69	41.22	20.41
Fyr Macedonia	0.50	41.09	15.45
Hungary	0.25	42.34	10.95
Kazakhstan	0.60	32.30	19.15
Latvia	0.42	50.21	28.63
Lithuania	0.43	39.04	13.55
Moldova	0.54	55.33	17.16
Mongolia	0.52	54.80	36.16
Nepal	0.87	32.43	7.08
Nicaragua	1.68	50.00	24.44
Paraguay	1.54	47.20	13.57
Peru	0.64	26.97	8.89
Philippines	1.32	65.68	24.94
Poland	0.45	47.72	26.68
Romania	0.36	46.89	16.18
Slovak Republic	0.64	31.02	13.89
Slovenia	0.26	47.10	14.29
Turkey	0.38	44.67	7.39
Ukraine	0.45	46.73	23.49

TABLE A5: ROBUSTNESS – ADDED CONTROLS

Coefficient of Female Owner Dummy Variable	Adjusted R Squared
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BASE	0.1181* [0.0632]	0.01
<u>Fractionalization</u> Ethnic	0.1119* [0.0614]	0.01
<u>Employees and Security</u> Total Employees, Security Costs as a % of sales	0.1145* [0.0654]	0.01
<u>Corruption and Voter Turnout</u> Corruption (Transparency International), Voter Turnout (IDEA)	0.1232* [0.0635]	0.01
<u>Population and Demographics</u> Proportion of Female Population, Percentage of Population in Urban Agglomerates, Population Density, Proportion of Population between 15 and 64	0.1557* [0.0754]	0.01
<u>Government Spending and Investment</u> Government Consumption & Total Investment over GDP	0.1137* [0.0622]	0.01
<u>Prison Capacity</u> Adult Prison Capacity	0.1309** [0.0626]	0.01

TABLE A6: ROBUSTNESS – EXTREME OBSERVATION DOMINANCE

	Coefficient of Female Owner Dummy Variable
<u>Dropping Extreme Crime Loss Observations</u>	
Bottom 1%	0.117* [0.063]
Top 1%	0.155* [0.081]
Top and Bottom 1%	0.155* [0.082]